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(54) **QUERY SIMPLIFICATION AND OPTIMIZATION INVOLVING ELIMINATING GROUPING COLUMN FROM GROUP BY OPERATION CORRESPONDS TO GROUP BY ITEM THAT IS CONSTANT**

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(58) Field of Search **707/1-7, 100-104**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,590,324 A	*	12/1996	Leung et al.	707/5
5,598,559 A	*	1/1997	Chaudhuri	707/2
5,713,020 A	*	1/1998	Reiter et al.	707/102
5,724,570 A	*	3/1998	Zeller et al.	707/3
5,761,653 A	*	6/1998	Schiefer et al.	707/2
5,761,657 A	*	6/1998	Hoang	707/4
5,781,896 A	*	7/1998	Dalal	707/2
5,822,750 A	*	10/1998	Jou et al.	707/2
5,832,475 A	*	11/1998	Agrawal et al.	707/2
5,873,075 A	*	2/1999	Cochrane et al.	707/2
5,884,299 A	*	3/1999	Ramesh et al.	707/2
5,963,936 A	*	10/1999	Cochrane et al.	707/3
6,092,062 A	*	7/2000	Lohman et al.	707/2
6,112,198 A	*	8/2000	Lohman et al.	707/3
6,199,063 B1	*	3/2001	Colby et al.	707/4

OTHER PUBLICATIONS

Surajit Chaudhuri et al., Including Group-By in query optimization, Proceedings of the 20th VLDB conference Santiago, Chile, 1994.*

Surajit Chaudhuri et al., Optimizing queries with Aggregate views, Advances in Database Technology-EDBT'96, 5th International Conference on Extending Database Technology, Avignon, France, Mar. 25-29, 1996, proceedings.*

T.Y. Cliff Leung et al. Query Rewrite Optimization Rules in IBM DB2 Universal Database, Chapter 2, pp. 153-168, No Date Available.

H. Pirahesh et al. (1992) Extensible/Rule Based Query Rewrite Optimization in Starburst, *ACM Sigmod* pp. 39-48.

A.Y. Levy et al. (1994) Query Optimization by Predicate Move-Around, Proceedings of the 20th VLDB Conference.

W. Yan and P. Larson (1994) Performing Group-By Before Join., Proceedings of the 10th Int'l Conference on Data Engineering, pp. 89-100.

D. Simmen et al. (1996) Fundamental Techniques for Order Optimization, Proceedings A CM SIGMOD International Conference on Management of Data, 25(2):57-177.

L.S. Cosby et al. (1998) Red Brick Vista: Aggregate Computation and Management, Proceedings of the 14th Int'l Conference on Data Engineering, pp. 659-664.

R. Bello et al. Materialized Views in Oracle, Proceedings of the 24th VLDB Conference (1998).

D. Srivastava et al. (1996) Answering Queries with Aggregation Using Views, Proceedings of the 22nd VLDB Conference, pp. 318-329.

* cited by examiner

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(57) **ABSTRACT**

A method, apparatus, and article of manufacture for simplifying and optimizing queries involving GROUP BY operations, when GROUP BY items involve constants and when there are "false" predicates in SELECT-HAVING clauses.

18 Claims, 4 Drawing Sheets

